8Fcs 6562

12/94

Gloucestershire Structure Plan: Boddington

Agricultural Land Classification

Prepared for MAFF by
G Shaw
ADAS Statutory Unit
Bristol

ADAS
FOOD, FARMING, LAND & LEISURE

Ministry of Agriculture, Fisheries and Food
Land Use Planning Unit
MAFF

GLOUCESTERSHIRE STRUCTURE PLAN: BODDINGTON

AGRICULTURAL LAND CLASSIFICATION

CONTENTS

		Page
SUMMARY		1
1.	INTRODUCTION	2
2.	CLIMATE	2
3.	RELIEF AND LANDCOVER	2
4.	GEOLOGY AND SOILS	3
5.	AGRICULTURAL LAND CLASSIFICATION	3
APPENDIX 1	References	5
APPENDIX 2	Description of the grades and subgrades	6
APPENDIX 3	Definition of Soil Wetness Classes	8
MAP		

GLOUCESTERSHIRE STRUCTURE PLAN: BODDINGTON

AGRICULTURAL LAND CLASSIFICATION SURVEY

SUMMARY

The reconnaissance survey was carried out by ADAS on behalf of MAFF as part of its statutory role in the preparation of the Gloucestershire Structure Plan. The fieldwork at Boddington was completed in November 1994 at a scale of 1:25,000. Data on climate, soils, geology and from previous Agricultural Land Classification (ALC) Surveys was used and is presented in the report. The distribution of grades is shown on the accompanying ALC Map and summarised below. Information is correct at this scale but could be misleading if enlarged.

Distribution of ALC grades: Boddington

Grade	Area (ha)	% of Survey Area	% of Agricultural Land	
3a	55.3	9.0	11.8	
3b	413.4	66.9	88.2	
Woodland	25.5	4.1		
Urban	33.4	5.4		
Non Agricultural	9.0	1.5		
Agricultural Buildings	3.8	0.6		
Not surveyed	77.5	12.5		
TOTAL	617.9	100.0	100.00	(468.7 ha)

The majority of the area surveyed is mapped as Subgrade 3b. These are poorly drained calcareous clays. There are small areas of better drained soils which are mapped as Subgrade 3a. Part of the site was not surveyed because access was not granted.

1. INTRODUCTION

A reconnaissance scale Agricultural Land Classification (ALC) Survey was carried out in November 1994 at Boddington on behalf of MAFF as part of its statutory role in the preparation of the Gloucestershire Structure Plan. The fieldwork covering 617.9 ha of land was conducted by ADAS at a scale of 1:10,000 with approximately one boring per 5 hectares of agricultural land. A total of 85 auger borings were examined and 3 soil profile pits used to assess subsoil conditions.

The published provisional one inch to the mile ALC map of this area (MAFF 1968) shows the grades of the site at a reconnaissance scale. Most of the site is mapped as Grade 3, although a small area is mapped as Grade 2 just south of the motorway junction. The flood plans of the Leigh Brook and River Chelt, together with a small area north of Becketts Farm in the north-western corner of the site, are mapped as Grade 4.

The recent survey supersedes this map having been carried out using the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF 1988). These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The grading takes account of the top 120 cm of the soil profile. A description of the grades used in the ALC system can be found in Appendix 2.

2. CLIMATE

The grade of the land is determined by the most limiting factor present. The overall climate is considered first because it can have an overriding influence on restricting land to a lower grade despite other favourable conditions.

Estimates of climatic variables were interpolated from the published agricultural climate dataset (Meteorological Office 1989). The parameters used for assessing overall climate are accumulated temperature, a measure of the relative warmth of a locality, and average annual rainfall, a measure of overall wetness. The results shown in Table 1 indicate there is no overall climatic limitation.

Table 1: Climatic Interpolations: Boddington

Grid Reference		SO 893 258
Altitude (m)		25
Accumulated Temperature (day °)		1491
Average Annual Rainfall (mm)		626
Overall Climatic Grade		1
Field Capacity Days		138
Moisture deficit (mm):	Wheat	114
	Potatoes	108

Climatic data on Field Capacity Days (FCD) and Moisture Deficits for wheat and potatoes are also shown. These data are used in assessing the soil wetness and droughtiness limitations referred to in later sections.

3. RELIEF AND LANDCOVER

Much of the site is gently undulating at an average altitude of 20 m AOD. The land rises to a ridge at 25 m AOD in the north-west, along which the A38 runs. The land drops away again to the far north-west.

At the time of the survey the agricultural land was being used for arable production and grazing with several areas of woodland found in the area.

4. GEOLOGY AND SOILS

The geology of the site is shown on the published 1:50,000 scale Solid and Drift geology map, sheet 216 (British Geological Survey 1988).

Most of the site is underlain by Recent Alluvium associated with the River Chelt, the alluvium extends north of the A4019 to the northern edge of the site. On the eastern edge, two areas of Lower Lias Clay are found associated with two small patches of Cheltenham Sand. Lower Lias Clay is also found to the west, in two "bands" east and west of the River Chelt. The former of these forms the western edge of a two-pronged lobe of Blue Lias (a clay-derived rock) which extends from the south into the middle of the site north of Boddington Village. Lastly, the north-west corner of the site has a banded geology pattern composed of various Triassic and Jurassic sedimentary rocks and Recent Alluvium.

The soils of the site were mapped at a reconnaissance scale of 1:250,000 by the soil survey of England and Wales in 1983. This map shows most of the site to comprise Evesham 2 Association which are described as slowly permeable calcareous clayey soils with some slowly permeable seasonally waterlogged non-calcareous clayey and fine loamy or fine silty over clayey soils. A broad band of Fladbury 1 Association soils derived from the alluvium is mapped. These soils are described as stoneless clayey soils in places calcareous and variably affected by groundwater. A small area to the west of the A38 is mapped as Worcester and Compton Associations which are stoneless reddish clayey soils which are variably calcareous.

During the recent survey soils very similar to the mapped Association were found. Most of the site comprises deep calcareous clays with heavy clay topsoils. The calcareous nature is variable with soils derived from the alluvium often being non-calcareous. Patches of lighter textured topsoils (heavy clay loam) were also found.

5. AGRICULTURAL LAND CLASSIFICATION

The distribution of ALC grades is shown in Table 2 and on the accompanying ALC map. This information could be misleading if shown at a larger scale.

Table 2: Distribution of ALC grades: Boddington

Grade	Area (ha)	% of Survey Area	% of Agricultural Land	
3a	55.3	9.0	11.8	
3b	413.4	66.9	88.2	
Woodland	25.5	4.1		
Urban	33.4	5.4		
Non Agricultural	9.0	1.5		
Agricultural Buildings	3.8	0.6		
Not surveyed	77.5	12.5		
TOTAL	617.9	100.0	100.00	(468.7 ha)

Subgrade 3a

The band of Subgrade 3a in the north-west comprises two soil types. On the eastern side of the A38 there are slightly stony, well drained clays which have a moderate workability limitation. To the west of the road the soils are reddish in colour and have a moderate wetness limitation. The topsoils are heavy clay loams which in combination with the Wetness Class II (see Appendix 3) assessment limits the soils to Subgrade 3a. The two most easterly blocks of 3a are well drained and are Wetness Class I. The profiles are heavy clays, which imposes a moderate workability limitation. The small area of 3a at Boddington House comprises heavy clay loams over clays with a moderate wetness limitation.

Subgrade 3b

The rest of the agricultural land surveyed has been mapped as Subgrade 3b. These are heavy clay profiles which are poorly drained with moderate wetness limitations. The soils are variably calcareous. The soils are mainly Wetness Classes III and IV with occasional Wetness Class II profiles. The Wetness Class IV profiles are variably calcareous. The presence of slowly permeable layers in the subsoils were confirmed in soil profile pits.

Other Land

There are several areas of woodland mapped in the survey area. Urban and other non-agricultural land is mapped. There are several areas of agricultural buildings. An area in the north-east was not surveyed because access was not granted.

Resource Planning Team
Taunton Statutory Unit
December 1994

Other Land

There are several areas of woodland mapped in the survey area. Urban and other non-agricultural land is mapped. There are several areas of agricultural buildings. An area in the north-east was not surveyed because access was not granted.

Resource Planning Team
Taunton Statutory Unit
December 1994

APPENDIX 1

REFERENCES

BRITISH GEOLOGICAL SURVEY (1988) Solid and Drift Edition, Sheet 216, Tewkesbury, 1:50,000

MAFF (1968) Agricultural Land Classification Map, Sheet 143, Provisional 1:63,360 scale.

MAFF (1988) Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for grading the quality of agricultural land), Alnwick.

METEOROLOGICAL OFFICE (1989) Climatological Data for Agricultural Land Classification.

SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 5, Soils of South West England, 1:250,000 scale.

SOIL SURVEY OF ENGLAND AND WALES (1973), Sheet SO82, Norton, 1:25,000 scale.

APPENDIX 2

DESCRIPTION OF GRADES AND SUBGRADES

Grade 1 - excellent quality agricultural land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly include top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 - very good quality agricultural land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 - good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a - good quality agricultural land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b - moderate quality agricultural land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4 - poor quality agricultural land

Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yields of which are variable. In most climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 - very poor quality agricultural land

Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

Descriptions of other land categories used on ALC maps

Urban

Built-up or 'hard' uses with relatively little potential for a return to agriculture including: housing, industry, commerce, education, transport, religious buildings, cemeteries. Also, hard-surfaced sports facilities, permanent caravan sites and vacant land; all types of derelict land, including mineral workings which are only likely to be reclaimed using derelict land grants.

Non-agricultural

'Soft' uses where most of the land could be returned relatively easily to agriculture, including: private park land, public open spaces, sports fields, allotments and soft-surfaced areas on airports/airfields. Also active mineral workings and refuse tips where restoration conditions to 'soft' after-uses may apply.

Agricultural buildings

Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses. Temporary structures (eg polythene tunnels erected for lambing) may be ignored.

Open water

Includes lakes, ponds and rivers as map scale permits.

Land not surveyed

Agricultural land which has not been surveyed.

Where the land use includes more than one of the above landcover types, eg buildings in large grounds, and where may be shown separately. Otherwise, the most extensive cover type will usually be shown.

Source: MAFF (1988) Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for Grading the Quality of Agricultural Land), Alnwick.

APPENDIX 3

DEFINITION OF SOIL WETNESS CLASSES

Wetness Class I

The soil profile is not wet within 70 cm depth for more than 30 days in most years.

Wetness Class II

The soil profile is wet within 70 cm depth for 31-90 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but not wet within 40 cm depth for more than 30 days in most years.

Wetness Class III

The soil profile is wet within 70 cm depth for 91-180 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31 and 90 days in most years.

Wetness Class IV

The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.

Wetness Class V

The soil profile is wet within 40 cm depth for 211-335 days in most years.

Wetness Class VI

The soil profile is wet within 40 cm depth for more than 335 days in most years.

Notes: The number of days specified is not necessarily a continuous period. 'In most years' is defined as more than 10 out of 20 years.

Source: Hodgson, J M (in preparation), Soil Survey Field Handbook (revised edition).

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Boddington	Pit 1	0°	PGR	Av Rainfall: 626 mm ATO: 1491 day °C FC Days: 138 Climatic Grade: 1 Exposure Grade: 1	Blue Lias
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
120/94	22/11/94	ASP 49 SO89262557	GMS		RPT/GMS 463

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	23	C	10YR52	0% (Vis)	None	None	-	-	-	Good	MVF, CF	Yes	Clear smooth
2	48	C	2.5Y53	0% (Vis)	None	None	WCSAB	Firm	Mod	Low	CVF	Yes	Clear smooth
3	85+	C	2.5Y62	0% (Vis)	cdogf 10YR68, 62 becoming many	None	WCSAB	Firm	Poor	Low	CVF	Yes	

Profile Gleyed From: 48 cm

Depth to Slowly Permeable Horizon: 48 cm

Wetness Class: II + calc + >50% C

Wetness Grade: 3b

Available Water Wheat: 131 mm

Potatoes: 108 mm

Moisture Deficit Wheat: 114 mm

Potatoes: 108 mm

Moisture Balance Wheat: 17 mm

Potatoes: 0 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3B

Main Limiting Factor(s): Wetness

Remarks:

Topsoil clay 54%

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Boddington	Pit 2	0°	Ploughed	Av Rainfall: 626 mm ATO: 1491 day °C FC Days: 138 Climatic Grade: 1 Exposure Grade: 1	Alluvium
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
120/94	22/11/94	ASP19 SO 88362531	G M Shaw		RPT/GMS 462

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size, Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	30	C	10YR41	0% (Vis)	None	None	-	-	-	Good	CVF	Yes	Abrupt clear
2	80+	C	2.5Y64	0% (Vis)	Mdogf 10YR56 2.5Y62	None	MCAB	Firm	Poor	~0.3%	FVF	Yes	

Profile Gleyed From: 30 cm

Depth to Slowly Permeable Horizon: 30 cm

Wetness Class: IV

Wetness Grade: 3b

Available Water Wheat: 126 mm

Potatoes: 103 mm

Moisture Deficit Wheat: 114 mm

Potatoes: 108 mm

Moisture Balance Wheat: 12 mm

Potatoes: -5 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3B

Main Limiting Factor(s): Wetness

Remarks:

Insufficient pores of 0.5 mm in horizon 2 to be permeable.
Topsoil clay 55%

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Boddington	*Pit 3*	*0°*	*Set aside*	Av Rainfall: 626 mm ATO: 1491 day °C FC Days: 138 Climatic Grade: 1 Exposure Grade: 1	*Alluvium*
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
120/94	1/12/94	ASP 75 SO89692636	G M Shaw		RPT/GMS468

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	*Structure:* Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	26	C	2.5Y44	0% (Vis)	*None*	*None*	MCSAB	*Friable*	-	Good	CVF	Yes	Gradual smooth
2	45	C	2.5Y54	0% (Vis)	None	None	MCSAB	Firm	Mod	Low	CVF	Yes	Clear smooth
3	70+	C	2.5Y64	0% (Vis)	*MDFO 10YR68*	*None*	*WCSAB in places MCAB*	*Firm*	*Poor*	Low	*FVF*	Yes	

Profile Gleyed From: 45 cm

Depth to Slowly Permeable Horizon: 45 cm

Wetness Class: III + Calc + >50% clay

Wetness Grade: 3b

Available Water	Wheat:	130 mm
	Potatoes:	107 mm
Moisture Deficit	Wheat:	114 mm
	Potatoes:	108 mm
Moisture Balance	Wheat:	16 mm
	Potatoes:	-1 mm
Droughtiness Grade:		2 (Calculated to 120 cm)

Final ALC Grade: 3B

Main Limiting Factor(s): Wetness

Remarks:

SOIL PLASTICITY RECORDING SHEET

ANNEX 2

SITE DATA

Grid Ref	SO8825		Site Name	Boddington			LPA	Tewkesbury	
AAR	626	ATO 1491		FCD	138	MD (wheat)	114	MD (potatoes)	108

SOIL PIT DATA

	PIT ONE SOIL SERIES Evesham 2			PIT TWO SOIL SERIES Fladbury 1			PIT THREE SOIL SERIES Fladbury/Evesham		
DEPTH	TEXTURE	PLASTIC Y/N	COMMENTS	TEXTURE	PLASTIC Y/N	COMMENTS	TEXTURE	PLASTIC Y/N	COMMENTS
10 cm	C	N	Ball no worm	C	N	Ball, no worm	C	Y	
20 cm	C	N	"	C	N	"	C	Y	
30 cm	C	Y	"	C	N	"	C	Y	
40 cm	C	Y	"	C	Y	"	C	Y	
50 cm	C	Y	"	C	Y	"	C	Y	
60 cm	C	Y	"	C	Y	"	C	Y	